$$f: x \to 2\,\frac{x+1}{e^{2x}} = 2\underbrace{(x+1)}_{u}\cdot\underbrace{e^{-2x}}_{v}$$

1a ② $(-1|0)\ (0|2)$

1b ⑥ $f' = 2\left[\underbrace{1\cdot e^{-2x}}_{u'\cdot v} + \underbrace{(x+1)}_{u}\cdot\underbrace{e^{-2x}(-2)}_{v'}\right]$

$= 2(1-2x-2)e^{-2x}$

$= \underbrace{-2}_{<0}\underbrace{(+1+2x)}_{<0}\underbrace{e^{-2x}}_{>0}$

$f' > 0 : 1+2x < 0 \Rightarrow 2x < -1$

$x < -\frac{1}{2}$ str. mo wa

$f'' < 0 \quad 1+2x > 0 \quad x > -\frac{1}{2}$ str. mo fa

$\Rightarrow$ Max bei $x = -\frac{1}{2}$

$f(-\frac{1}{2}) = 2\cdot\frac{1}{2}\,e^{1} = e$

Max $(-\frac{1}{2}|e)$

1c ⑧ $f'' = -2\left[\underbrace{2\,e^{-2x}}_{u'\cdot v} + \underbrace{(1+2x)}_{u}\cdot\underbrace{e^{-2x}(-2)}_{v'}\right]$

$= -2[\cancel{1}-\cancel{1} - 2x\ ]e^{-2x}\cdot 2$

$= 8x\underbrace{e^{-2x}}_{\neq 0}$

$f''=0 \Rightarrow x^W = 0 \quad f''>0$ für $x>0$

$f''<0$ für $x<0$

$\Rightarrow f''$ hat Vorzeichenwechsel an der Stelle $x=0$ ("von − auf +")

$\Rightarrow$ WP bei $x=0 \quad y^W = 2$

Gleichung einer Tangente an den Graphen der Fkt f an der Stelle $x = x_0$

$t: y = (x-x_0)f'(x_0) + f(x_0)$

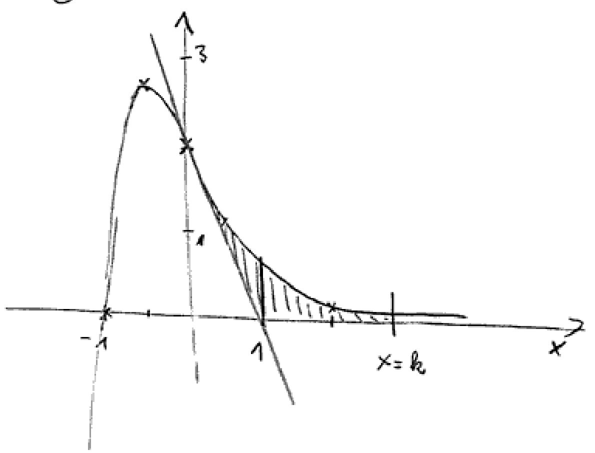
$x_0 = x^W = 0\ ;\ f(0) = 2,\ f'(0) = -2$

$\Rightarrow t: y = -2x + 2$

1c ③ $\lim\limits_{x\to\infty} \underbrace{2(x+1)}_{\infty}\underbrace{e^{-2x}}_{0} = 0$

Asymptote: $y=0$ also die x-Achse

1e ⑥ $f(0{,}5) = \frac{3}{e}\ ;\ f(2) = \frac{6}{e^4}$



2a ④ $F = -(x+1{,}5)\,e^{-2x} \qquad F' = f$

$F' = -\left[1\,e^{-2x} + (x+1{,}5)\,e^{-2x}(-2)\right]$

$= -[1 - 2x - 3\ ]e^{-2x}$

$= (2x+2)\,e^{-2x} = 2(x+1)e^{-2x}$

2b ⑧ Fläche $= \int_0^1 (f-t)\,dx + \int_1^k f\,dx = A(k)$

$= \cancel{F(1)} - F(0) - T(1) + T(0) + F(k) - \cancel{F(1)}$

$(T(x) = -x^2 + 2x)$

$A(k) = +1{,}5 - 1 + 0 + (-1)(k+1{,}5)e^{-2k}$

$A(k) = -(k+1{,}5)e^{-2k} + 0{,}5$

2c ③ $\lim\limits_{k\to\infty} A(k)$

$\lim\limits_{k\to\infty}\left[\underbrace{-\underbrace{(k+1{,}5)}_{\infty}\underbrace{e^{-2k}}_{0}}_{0} + 0{,}5\right] = 0{,}5$